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marl loess of southwestern Indiana consists of wind deposited true loess, stream laid valley filling, and dune sand, and that the true loess part of it together with the "common loess" corresponds to the well-known loess of other parts of the Mississippi basin.

EUGENE WESLEY SHAW

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*SOCIETIES AND ACADEMIES*

ST. LOUIS ACADEMY OF SCIENCES

AT a meeting of the Academy of Sciences of St. Louis, held October 19, Professor Nipher gave an account of his work during the summer of 1914, at his summer place in Hessel, Mich., on "Magnetic Disturbances in the Earth's Field due to Dynamite Explosions, Burning Black Powder and the Fog-horn of a Steamer."

The magnetic needle was mounted on a frame of timber, the vertical posts of which were set two feet into the ground. The frame and the boxes containing the control magnets were loaded with half a ton of rocks. The boxes containing the control magnets were also clamped to the frame with large wooden clamps. The base of the air-tight vessel containing the magnetic needle was also clamped to the frame. The torsion head was braced by means of wooden bars. Four cords at right angles to each other were attached to the torsion head. They passed outward and downward through holes in the table, and upon them were hung two bars of wood at right angles to each other. These bars were also loaded with rock. The apparatus was protected from heat effects by a series of blankets within the tent, having air-spaces between.

No difficulty was found in producing marked local disturbances in the earth's field by means of dynamite suspended in air to the east and to the north of the tent. The needle being at right angles to the magnetic meridian, this disturbance indicated a variation in the horizontal intensity.

The amount of dynamite exploded varied from half a stick six or eight feet from the tent, to thirty sticks distant 275 feet. In the larger explosions, the sticks were placed end to end on bars of wood having a cross section  $1 \times 1\frac{1}{2}$  inch. Each stick of dynamite was securely held in place upon the bar by means of a winding of heavy cord. The ends of the bar suffered no appreciable injury. Those parts in contact with the dynamite vanished in dust so fine that it was difficult to find any trace of it. The changes in the position of the needle in

explosions of this character amounted to ten or fifteen minutes of arc.

Much more marked effects were produced by distributing half a stick of dynamite into a column about 15 feet in length. It was packed closely into the angle of a little trough of wood, which rested upon a heavy beam of wood. The trough was held in position by means of masses of rock hung on cords. The column of dynamite was in line with the needle and either above or below the level of the needle. In this way deflections of about one degree of arc were produced. The direction of deflection was reversed by reversing the direction in which the explosion traversed the column. The end of the column nearest the needle was distant from it about ten feet.

This seems to indicate that a magnetic field is created around this exploding column, like that which exists around a wire conductor carrying a current of electricity. In most of the experiments of this character only a small part of the column exploded. It is believed that the conditions which will cause an explosion of the entire column with equal violence throughout have been finally attained, and this work will be continued.

The black powder was spread over a platform having an area of 25 square feet, placed a few feet from the west side of the tent. The amount of powder spread over the platform was from 25 to 50 pounds. The flame shot upward to a height of 15 to 30 feet. The lines of the earth's field were deflected around the region filled by this flame. The intensity of field within the tent was momentarily increased. The deflection of the needle amounted to from 25 to 50 minutes of arc.

At the request of Professor Nipher, the captains of the steamers of the Arnold Transit Co. were instructed by the president, Mr. Geo. T. Arnold, to blow a loud and prolonged blast on their fog-horns when at the nearest point to the observing station. This distance was about half a mile. Appreciable effects were thus produced when the air was quiet, the sky was clear and the intensity of the field had reached a high value. The result in every case was to decrease the intensity of the earth's field.

In two cases the blast from the 5 o'clock boat was at once followed by a premature appearance of the sunset disturbance. Rhythmic vibrations over from 10 to 20 degrees of arc at once followed, and continued for four or five minutes. This result needs further examination under more favorable conditions.

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*Recording Secretary*